

**Collegio Carlo Alberto**  
**Network Analysis**  
**Spring 2014**

**Instructors: Gerardo Ferrara and Pietro Terna**

**Contact Information**

Collegio Carlo Alberto

Office: TBA

Email 1: gerardo.ferrara@unito.it

Email 2: pietro.terna@unito.it

**Course Description**

There has been a dramatic rise in the use of social network analysis over the last decade. Social network analysis focuses on the relationships between actors and acknowledges that an individual's behavior is influenced by those around them. This view means that the unit of analysis is not the individual, but an entity consisting of the individuals and the linkages connecting them. This will be a practical course focused around the construction and analysis of network data, also considering how to test network hypothesis. A significant part of the course will be dedicated to the use of networks in very common tools, as NetLogo and Python with NetworkX.

**Text**

*"Social Network Analysis"*, Scott, J., Newbury Park CA, Sage, 2000.

*"Introduction to Social Networks"*, Hanneman, R., online book free on the web.

*"NetLogo handbook"*, free with the package.

*"Social Network Analysis for Startups"*, Tsvetovat, M. and Kouznetsov A., O'Reilly Media, 2011.

**Websites**

Spyder at <http://code.google.com/p/spyderlib/>

NetworkX at <http://networkx.lanl.gov>

**Homework**

Homeworks will be assigned on a regular schedule. Late homework will not be accepted.

**Final exam**

A final paper of about 4,000 words, describing a problem to be analyzed and applying computations to it.

## **Grading**

Attendance (10%), Homework (60%), Final Exam (30%).

## **Working Together**

It is okay to work together on homework. However, when it comes time for you to write up the solution, I expect you to do this on your own.

## **Cheating**

The University's *minimum penalty* for cheating or plagiarism is *a failure in the course*.

## **Suggestions**

Suggestions for improvement are welcome at any time. Any concern about the course should be brought first to our attention. Further recourse is available through the offices of the Master.

## **TOPICS OF THE COURSE**

### **I. Introduction** (prof. Ferrara)

- Introduction to economic, social, and financial networks
- Research topics in social networks
- Graph structures
- Matrix representations
- Writing a statement of probability

### **II. Analysis** (prof. Ferrara)

- Local structure in social networks
- Node classification in social networks
- Evolution in dynamic social networks
- Prediction in social networks
- Statistical analysis of network dynamics

### **III. Using NetLogo to implement agents in networks** (prof. Terna)

- A quick introduction to NetLogo

- Main ideas on agents in networks
- The NetLogo model library on networks

## **VI. Python with NetworkX for network analysis** (prof. Terna)

- Using Python with Spyder
- Getting oriented in Python and NetworkX
- An example gallery